California High-Speed Train

BUSINESS PLAN

November 2008

CALIFORNIA
HIGH-SPEED RAIL
AUTHORITY

SIMULATION ARTWORK: NC3D

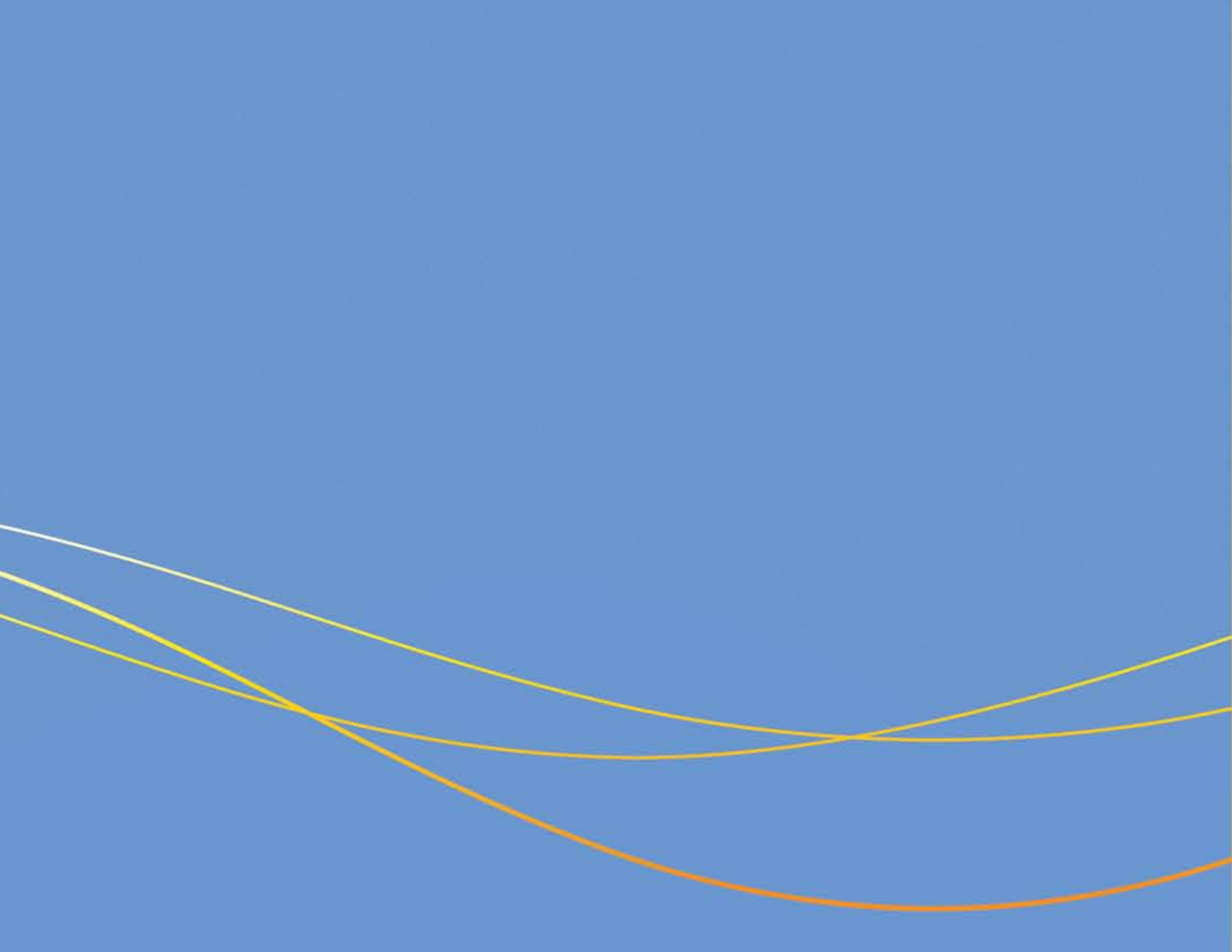

TABLE of CONTENTS

"A Powerful Lever for Regional Development

In 25 years, the [French] TGV has gradually brought major urban centres closer together and the distance between them is no longer counted in kilometres. Lille is now one hour from Paris and three hours from Lyons. Lyons is two hours from the capital, Marseille and Bordeaux are three hours from it. Weaving its web as far as the regional heartlands, due to the compatibility between the high speed lines and the conventional network, very high speed has reduced the number of journeys between provinces: 250 stations are today served, some of which, like Avignon, have been designed by leading architects. Very high speed has provided a strong stimulus to local economies: thanks to the TGV, Lyons has become one of the principal convention and exhibition centres in France. New businesses have grown up around stations, such as the very modern Euralille business district which covers 90 hectares next to the Lille-Europe station. Numerous tourist zones have been revitalised, becoming easily accessible to new groups of customers who do not hesitate to make the return journey in the same day. The TGV has also permitted very enclosed regions, such as the North of France, to be accessible to European capitals.

New forms of mobility, new ways of life

With its unique assets—rapid service between city centres, freedom to move around on board, comfort, safety, reliability and energy efficiency—very high speed has regenerated rail passenger transport, which has grown by 6.2% annually in the last ten years. On all three hour services—even four hours since the lengthening of airport check-in times—it dominates the market opposite air travel. The TGV has changed the travel behavior of 80 million passengers who use the French high speed network each year. It has also changed the way in which they live, enabling them to continue living in their regions: every day, 45,000 inhabitants of Tours or Lille who work in Paris, make the return journey by train."

—Excerpted from *AT Magazine,* 3rd Quarter, 2008

BUSINESS PLAN 2008
Overview

As this update of the High-Speed Train Business Plan is finalized, California—along with the rest of the country—is confronting a financial crisis that is weakening the economy and costing jobs. The value of California's high-speed train project becomes even more quantifiable in such times. As a public infrastructure project on the scale of the public works water projects of the 1930s and the highway projects of the 1950s, a high-speed train will be a whole new transportation option for the state, providing thousands of jobs and stimulating California's public and private economies.

Figure 1 Shinkansen hgh-speed trains – Japan

Transportation innovation has been at the forefront of California's economic strength and diversity for more than a century. From local roads to the state's renowned system of freeways and interstate highways, from some of the world's most important airports to one of the busiest freight rail systems in the country, California's transportation system has nourished its vitality.

But with success has come challenge. For the last 30 years, the state's population and economic growth have outpaced the transportation system. Congestion and the cost of confronting it now challenge California's legendary mobility.

Elsewhere in the world today, electrically powered high-speed trains carry hundreds of millions of passengers each year in 11 countries, including seven of the top 10 economies in the world. They operate day in and day out on nearly 4,000 miles of dedicated track at speeds from 150 to 220 mph, safely separated from roads, other rail lines and pedestrians. Over the years, high-speed trains have carried 10 billion passengers on business trips, commutes, visits to friends and family, and vacations, without a single fatality on infrastructure designed for high speeds.

Figure 2 ES Italia high-speed train – Italy*

Inspired by those stunning successes in Asia and Europe, the State of California in the mid-1990s began exploring high-speed trains as an additional transportation option to relieve demand on our increasingly stressed highway, air travel and conventional passenger rail systems. The California High-Speed Rail Authority was created by the State Legislature and the Governor

in 1996 and tasked to prepare a plan and design for construction of an economically viable high-speed train line linking major metropolitan areas to help sustain the state's long-term mobility and economic growth.

After more than a decade of research, planning, engineering, environmental and economic review, and public and legislative debate, an 800-mile high-speed train system with speeds up to 220 mph between Northern and Southern California is poised to move towards construction. It will be a statewide venture on the scale of the California State Water Project and the state highway system. It will transform the way people travel between cities in California, offering a choice of driving, flying or using high-speed trains.

Figure 3 Next Generation AGV high-speed train – France

In 2000, the Authority produced investment-grade forecasts of ridership, revenue, cost and benefits of the system.

Since 2000, the Authority has:

- **Certified** the Statewide Program Environmental Impact Report/Environmental Impact Statement (EIR/EIS), received and reviewed over 2,000 public and government agency comments, and determined preferred corridors and stations for the majority of the line.
- **Certified** the Bay Area-Central Valley Program EIR/EIS, which established the Pacheco Pass as the preferred high-speed train route, connecting the San Francisco Bay Area with the Central Valley, while pursuing a partnership with local regional transit agencies to develop a joint-use high-speed rail infrastructure project in the Altamont Pass corridor.
- **Selected** the general alignment and station locations for the 800-mile system designed to carry over 100 million people a year by 2030.
- **Worked** with regional transportation agencies to integrate the statewide high-speed train with local and regional commuter systems.
- **Created** an institutional structure to manage construction of high-speed train infrastructure and technology adapted to California's needs.
- **Developed** a financing plan that shares responsibility with the local, state and federal governments together with significant investment from the private sector.
- **Launched** a program for comprehensive long-term management of operations and assets of a fully functioning high-speed passenger train system.
- **Commenced** project-level environmental analysis.

In 2008, the State Legislature approved and Governor Arnold Schwarzenegger signed AB 3034 (Galgiani), improving the existing high-speed train $9.95 billion bond measure on the November 2008 ballot. Proposition 1A asked California voters to approve a down payment on construction of the high-speed train line, the state's newest and most promising addition to our transportation system. The new legislation includes significant project and financial oversight and other taxpayer protections.

California's interregional system will be the first and only contemporary high-speed train operating on dedicated right-of-way in the United States—a 21st century alternative for a state transportation system built for the 20th century. While Amtrak's Acela train in the Northeast Corridor operates for brief periods at up to 150 mph on a modern, upgraded rail bed, it runs at slower speeds over much of its route, sharing track with conventional rail equipment and on right-of-way and infrastructure not capable of 200 mph speeds.

Figure 4 High-speed train speeds

Figure 5 A simulation of the high-speed train traveling through Mission Bay in San Diego SIMULATION ARTWORK: NC3D

Californians will be able to travel from Los Angeles to San Francisco in less than two hours and 40 minutes, cruising at speeds of 220 mph. California's high-speed trains will:

- *Be built on dedicated right-of-way, safely separated from cars and trucks, pedestrians and other rail traffic.*
- *Use only a fraction of the energy of automobiles and airplanes.*
- *Help free California from dependence on foreign oil and reduce greenhouse gases that cause global warming.*

In developing California's high-speed train system, the Authority has taken advantage of the decades of research, development and everyday operations of safe and reliable high-speed train service throughout Asia and Europe. By adapting existing and proven electric-powered, steel-wheel-on-rail technology, the Authority has eliminated risks associated with unproven technology and reduced the costs of design and construction. California's high-speed train will be more than a transportation system. It will create more than $150 billion in measurable present-value benefits—approximately three times the present value of the train's capital and operational costs over the next 40 years. This updated business plan outlines both the costs and the significant benefits that will accrue to travelers, to the environment and to the economy from a high-speed train system.

California's high-speed train will be built with major capital contributions from multiple sources, including the State of California, the federal government, local and regional governments and private sector investors. Under Proposition 1A, state bond funding for construction cannot be spent until matching federal, local and private funding is also secured. Operation and maintenance will be financed by users through paid fares.

This California High-Speed Rail Authority Business Plan is a "snapshot in time" of thousands of hours of detailed analysis for the economic foundation of the high-speed train system. The scale and the length of time it will take to construct the system requires continuous economic review and adjustment to identify long-term costs, ridership and economic impacts which are dynamic in nature. As such, construction and materials, land acquisition costs, energy and even the transportation preferences of millions of Californians will evolve over future decades.

However, this Business Plan provides a credible, reasonable and experience-based estimate of the system's current financial and economic outlook. Core calculation for the Ridership and Revenue and Economic Benefits in this Business Plan was prepared by Cambridge Systematics (CS), a national leader in transportation economics and modeling with extensive experience in California.

The construction costs and operations costs were developed by Parsons Brinckerhoff, a leading international engineering and program management firm with direct experience in high-speed train projects in Asia and Europe, supplemented within the Program Management Team with expertise from SYSTRA, a major international consultant group with worldwide experience in design, construction and operation of similar high-speed train lines. The underlying cost assumptions, operations, maintenance and capital costs were also reviewed by European and Japanese government rail agencies.

The financial projections and plan were prepared by Infrastructure Management Group, a nationally respected advisor to local, state and federal governments on infrastructure financing strategy based in the Washington, D.C., region with input from Barclays Capital and Goldman Sachs.

The Authority assumes that the full high-speed train system will be in place by 2030. Consistent with current environmental evaluation and project planning, however, this Business Plan is focused on the backbone link between Los Angeles/Anaheim and San Francisco for which financial calculations have been made.

Figure 6 A simulation of the San Francisco Transbay Terminal Interface

SIMULATION ARTWORK: NC3D

The Need

High-Speed Trains Will Meet Growing Demand

In 2000, more than half a billion interregional trips were made in California—96% by car, 4% by air, and 1% by conventional passenger rail (Amtrak, Metrolink, ACE, Capital Corridor, etc.). The California Department of Finance forecasts the state's population will grow by 40% to 50 million by 2030, and employment will grow by 51%. This growth will nearly double total interregional travel to one billion trips per year, with auto keeping the lion's share, but with a nearly five-fold increase in conventional rail trips and an 80% increase in air travel.

Within the Los Angeles/Anaheim region, over 22 billion auto trips will be made in 2030, 34% more than in 2000, and conventional train trips will triple. The San Francisco Bay Area will see more than seven billion auto trips, and the San Diego region over eight billion. Conventional train traffic will grow much faster than auto trips, but from a much smaller base.

High-speed trains will alleviate the need to build—at a cost of nearly $100 billion—about 3,000 miles of new freeway plus five airport runways and 90 departure gates over the next two decades. And those new runways and freeway lanes can happen only if significant environmental and social challenges can be overcome. A statewide high-speed train system—already subjected to environmental review—will meet that same need at about half the cost. Significantly, the high-speed train project has the support of operators of the Los Angeles, San Francisco and San Diego international airports as well as other major airport operators around California.

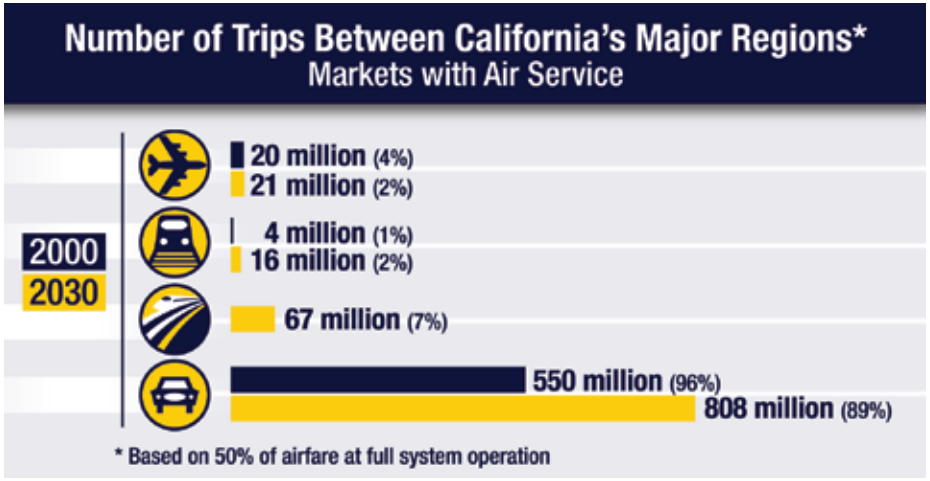

Figure 7

The Route

High-Speed Trains Will Provide

By the terms of AB 3034 (Galgiani), individual segments of the high-speed train network will be developed as matching funds become available from local, federal and private sources. While the system may not be constructed as a single continuous project, completion of the major link between Los Angeles/Anaheim and San Francisco through the Central Valley will remain the priority.

When completed, California's high-speed train will provide a new transportation option to more than 90% of the residents of the state. More than 230 weekday trains (115 in each direction) are planned to serve the statewide intercity travel market. A high-speed train system between Los Angeles/Anaheim and San Francisco with extensions to Sacramento and San Diego will carry more than 90 million passengers, generating $3.6 billion in gross revenues annually, with fare levels assumed in the EIR/EIS to be around half the cost of airfares.

The system will be built, wherever possible, along or adjacent to existing rail transportation facilities instead of creating new transportation corridors, reducing potential unplanned growth and sprawl problems in both rural and urban areas. Stations will be spaced approximately 50 miles apart in rural areas and closer together in metropolitan areas to realize the most efficient benefit from high-speed travel.

In virtually every major city, the high-speed train station will be developed in conjunction with existing rail transportation hubs to produce the most efficient linkages to local and regional transit systems. Efficient integration of the high-speed train network with local transportation systems is paramount and key to the success of both.

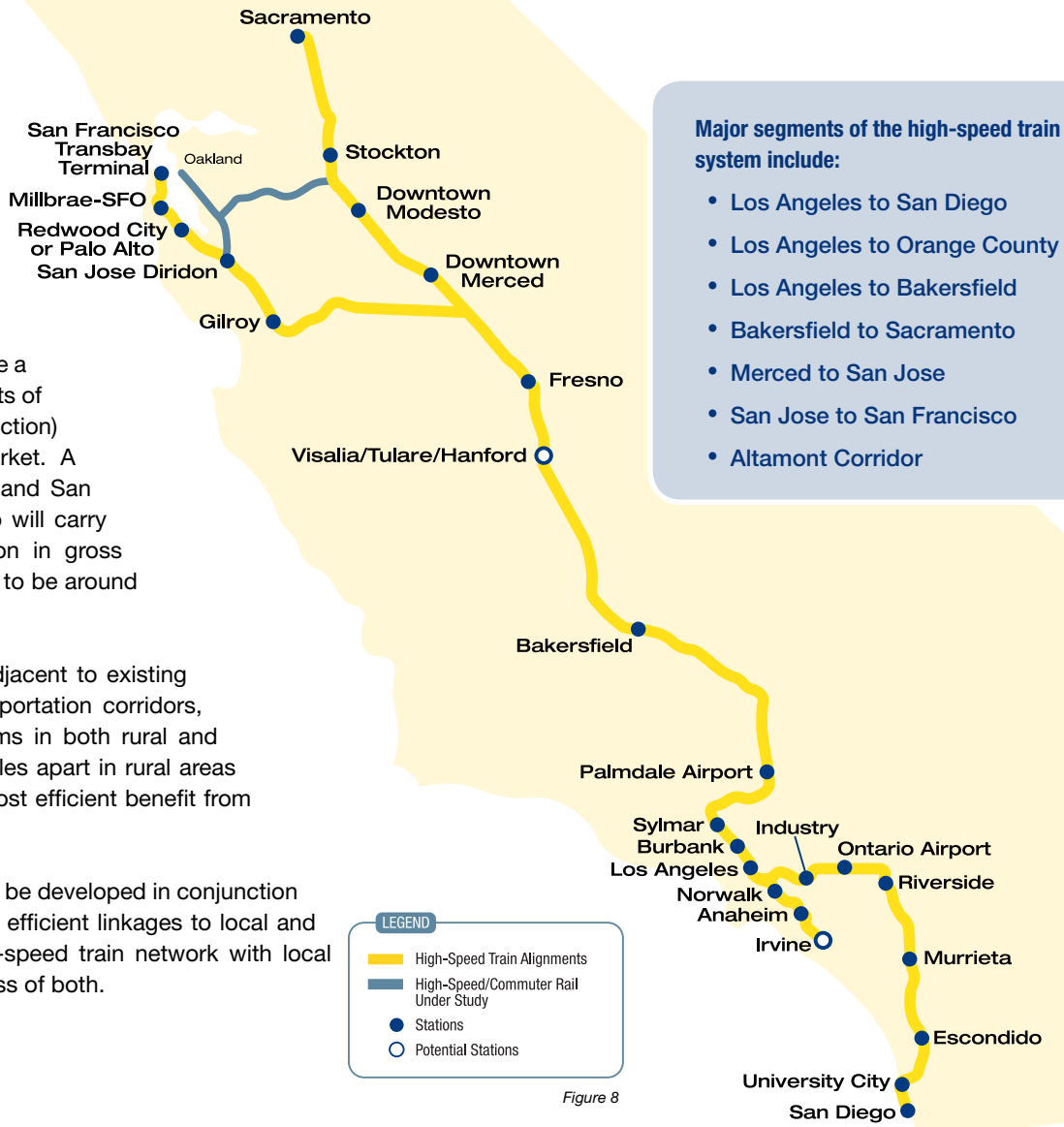

Figure 8

Major segments of the high-speed train system include:

- Los Angeles to San Diego
- Los Angeles to Orange County
- Los Angeles to Bakersfield
- Bakersfield to Sacramento
- Merced to San Jose
- San Jose to San Francisco
- Altamont Corridor

Los Angeles to San Diego via the Inland Empire

Service between downtown Los Angeles and San Diego will be routed east from Los Angeles Union Station through the Inland Empire (Riverside and San Bernardino counties) using existing transportation corridors, and then continue south from Riverside using the Interstate 215/Interstate 15 highway corridor through Escondido. Intermediate stations will be built to serve East San Gabriel Valley, Ontario Airport, Riverside, Temecula Valley, Escondido and University City (San Diego). The southern terminus of the system will be Santa Fe Depot in downtown San Diego. This corridor will be reviewed and, if necessary, adjusted under the agreement between the Authority and regional transportation agencies.

Los Angeles to Bakersfield

The MTA/Metrolink corridor is planned to be used for the segment from Los Angeles Union Station to Santa Clarita. From there, high-speed trains will travel through the Antelope Valley, crossing the Tehachapi Range through the Mojave Pass (SR 58 corridor), which will minimize tunneling, seismic constraints, and risks and environmental impacts. In addition to the Palmdale Airport/Transportation Center, potential intermediate stations could be located at Sylmar to serve the San Fernando Valley, Simi Valley and Newhall/Santa Clarita areas, and downtown Burbank (Metrolink) to serve the Burbank/Glendale area.

Los Angeles to Anaheim

Service from Los Angeles Union Station to the ARTIC station in Anaheim will follow the existing passenger and freight rail corridor with a potential intermediate station at either Norwalk or Fullerton. High-speed trains will operate at a maximum speed of 110 mph with the possible use of shared track with existing Metrolink commuter trains.

	San Francisco (Transbay)	San Jose	Sacramento	Fresno	Los Angeles Union Station	Anaheim	Riverside	San Diego
San Francisco (Transbay)		:30	1:53	1:20	2:38	2:57	3:10	3:56
San Jose	:30		1:24	:51	2:09	2:28	2:41	3:27
Sacramento	1:53	1:24		:59	2:17	2:36	2:49	3:35
Fresno	1:20	:51	:59		1:24	1:43	1:56	2:42
Los Angeles Union Station	2:38	2:09	2:17	1:24		:20	:33	1:18
Anaheim	2:57	2:28	2:36	1:43	:20			
Riverside	3:10	2:41	2:49	1:56	:33			:48
San Diego	3:56	3:27	3:35	2:42	1:18		:48	

Figure 9 Express Trip Times

Figure 12

Figure 10

Bakersfield to Sacramento

The alignment through the Central Valley between Bakersfield and Sacramento will generally utilize one of the two existing freight rail corridors. Preferred downtown multi-modal stations have been selected throughout the Central Valley at Sacramento, Stockton, Modesto, Merced, Fresno and Bakersfield. A potential Visalia/Hanford/Tulare station will be fully evaluated as part of the project-level environmental review.

Merced to San Jose

Access to the San Francisco Bay Area will be through the Pacheco Pass in the vicinity of State Route 152, between the State Route 99 corridor north of Fresno with a station in Gilroy, serving the Monterey Bay area. From Gilroy to San Jose, the alignment could potentially utilize the existing Caltrain rail corridor.

San Jose to San Francisco

Along the San Francisco Peninsula between San Francisco and San Jose, the system will utilize the Caltrain rail right-of-way and share track where possible with express commuter rail services. This segment is assumed to have four tracks, with the two middle tracks being shared by Caltrain and the high-speed train, and the outer tracks being used by Caltrain. High-speed train service will operate at maximum speeds of 125 mph along the Peninsula and provide 30-minute express travel times between San Jose and the Transbay Transit Center in downtown San Francisco. Other potential stations will be located in Redwood City or Palo Alto and in Millbrae serving San Francisco International Airport.

Altamont Corridor

In partnership with local and regional agencies and transit providers, the California High-Speed Rail Authority is pursuing a joint-use ("Regional Rail" and high-speed train) infrastructure project in the Altamont Pass corridor—as advocated in the Metropolitan Transportation Commission's recently approved "Regional Rail Plan for the San Francisco Bay Area." The Authority is spearheading environmental studies and working in partnership with other agencies to secure local, state, federal and private funding to develop a plan that will allow high-speed train service through the Altamont Pass. Providing connectivity and accessibility to Oakland and Oakland International Airport via this route is a crucial objective for the Authority.

Figure 11


Sacramento
Stockton
San Francisco Transbay Terminal
Oakland
Downtown Modesto
Millbrae-SFO
Downtown Merced
Redwood City or Palo Alto
San Jose Diridon
Gilroy
Fresno
Visalia/Tulare/Hanford
Bakersfield
80
88
5
152
198
99
Legend
Rail Alignment
Urban Area
Farmland
National Forest
Public Lands
State Parks
Open Space
Water
HST Alignments
High-Speed/Commuter Rail under study
Stations
Potential Station
Map based on 2005 Statewide Programmatic EIR/S preferred route, and staff recommendation to Authority Board December 19, 2007
Mapping Sources: US Census 2000; CA Dept. of Conservation, Farmland Mapping and Monitoring Program 2000;
California Resources Agency Legacy Project 2002; CA Dept. of Fish and Game 1999

Figure 12

The Benefits

High-Speed Trains Will Benefit the State in a Number of Quantifiable Ways

In the year 2030, the high-speed train will create $11 billion in direct benefits to its riders, to drivers and air passengers who experience less congestion, and to the state as a whole in pollution reduction and accident reduction. In five years of operation, the benefits will exceed the cost of building the line and operating it. In economist's terms, California will realize $150 billion in present value of benefits by 2050—nearly triple the total present value of the cost of the project. Not only will high-speed train passengers benefit from the system, more than a third of the benefits will be enjoyed by air and auto travelers in the form of reduced delays, reduced air pollution, and reduced auto accidents and fatalities.

Experts calculate about 160,000 jobs will be needed to construct the high-speed train, and more than 320,000 permanent jobs will result by 2030 both directly and indirectly from the system—including jobs in tourism, transportation, services and security, for example. Related jobs in the economy will continue to grow to more than 450,000 by 2035 and beyond.

By making fewer intercity automobile trips each day, Californians will benefit from reduced highway accidents and air pollution. These highway-related benefits have a present value of over $13.8 billion. This estimate undoubtedly understates the true pollution reduction benefit since it only includes reduction in primary pollutants (hydrocarbons, particulate matter, carbon monoxide) from automobile travel. Quantifying the benefits of greenhouse gas reduction from reduced auto travel and other energy usage will greatly increase the overall environmental benefit; however, greenhouse gas analysis methods are still being developed.

The computation of the high-speed train's benefits is consistent with guidance provided by the Environmental Protection Agency (Guidelines for Preparing Economic Analyses) and the Federal Highway Administration (Economic Analysis Primer). Conservative, reasonable assumptions were used throughout, and not all potential benefits were included. For example, the analysis does not include the potential reduction in airport ground access congestion, reduced highway maintenance and capital costs, or monetary benefits of reduced greenhouse gas emissions.

Results of Benefit-Cost Analysis

Present value in 2008 dollars, discounted 4 percent through 2050
Total Amount 2010-2050

	Millions of 2008 Dollars
Benefits	
Passenger Revenue	$33,718
Benefits to High-Speed Train Passengers	
Intercity Travelers	$55,210
Urban Area Travelers	$1,542
Benefits to Highway Travelers	
Congestion Reduction for Intercity Travelers	$27,081
Congestion Reduction for Urban Area Travelers	$15,385
Accident and Pollution Reduction	$13,822
Benefits to Air Travelers	
Delay reduction for Airline Passengers	$1,969
Delay Reduction for Airline Operations	$1,750
Total Benefits	***$150,478***
Costs	
Capital	$33,993
Operating & Maintenance	$19,065
Total Costs	**$53,058**
Total (Net Present Value)	***$97.420***
Benefit-Cost Ratio	***2.84***
Internal Rate of Return	***8.8%***

Figure 13

For public investment projects such as the high-speed train system, if quantifiable benefits are greater than the total costs, then the project is said to be economically justified. In the case of high-speed trains, such quantifiable benefits include:

- Intercity passenger revenue
- Attractive fares for high-speed train passengers (net of fares paid)
- Reduction of delays and waits for air passengers
- Reduction of airline operating costs
- Reduction of highway delay for both intercity and urban auto trips
- Reduction of accident and air pollution costs from intercity and urban auto trips

Major Additional Benefits Are Hard to Quantify, But Real

In addition to those benefits described on page 12, the high-speed train will bring other opportunities and benefits to the state and its residents that are difficult to quantify accurately.

Transportation Capacity and Diversity Improvements

Foremost, the high-speed train project represents a major transportation capacity improvement that can be tapped by future generations in ways as yet unimagined. It will promote stability through diversity in California's transportation network. High-speed trains will provide a third option for intercity travel, giving Californians the choice of using airplanes, autos or high-speed trains.

The economic vitality and stability of California has depended historically on the ability to move people, goods and information freely and efficiently between population centers, agricultural markets and ports of entry. This project's improvement to the statewide infrastructure will support commuter as well as intercity passenger traffic and high-speed freight service. High-speed trains will complement and connect to airports and highways, providing a substantially greater degree of mobility for those who travel in California.

Summary of Benefit-Cost Analysis Results
(through 2050)

Total Benefits	$150.5 (billions of 2008 dollars)
Total Costs	$53.1 (billions of 2008 dollars)
Net Present Value	$97.4 (billions of 2008 dollars)
Benefit/Cost Ratio	2.84

Note: Excludes benefits from induced employment growth and business efficiency savings, greenhouse gas and energy savings, development around stations, and potential freight revenues, and avoided costs for highway maintenance and capital investment.

Figure 14

Environmental Improvements

The high-speed train system will reduce California's dependence on fossil fuels and foreign oil—a reduction of 12 billion pounds of CO_2 and 12.7 million barrels of oil per year by 2030. Since it will use electric power, high-speed trains can be a key element in helping California meet AB 32 greenhouse gas reduction goals, and will have far less environmental impact than expanding highways and airports.

In the face of a natural disaster, high-speed trains will offer insurance against major disruptions to intercity travel, much as the BART system provided mobility after the 1989 Loma Prieta earthquake. Similarly, after the Northridge quake in 1994, Metrolink opened before freeways. For the Central Valley, a high-speed train system will make the region much more accessible, providing a frequent, affordable alternative to air travel, reducing travel times by hours compared to driving, and eliminating much of the uncertainty and unreliability of both air and highway travel resulting from ground fog and other climatic conditions present at certain times.

Local and Regional Benefits

High-speed train systems typically act as a catalyst to strengthen urban centers, promote more compact development around stations, and even increase local property values. The high-speed train system will provide a means to directly access urban centers, bypassing the congested roadways leading from airports and intercity highway corridors. It will also improve service to central city employment centers, and to residents and groups with low auto availability (whether by choice or necessity). In concert with suitable local land use and economic development policies, high-speed trains can strengthen existing city centers by maintaining and improving accessibility.

California Leadership Enhancement

High-speed trains will enhance the quality of California as a place to live and do business. The advanced technology involved in constructing and operating the system—everything from the latest in signaling, communications and controls systems to the most advanced structural engineering techniques—is consistent with California's leadership in technology. Implementation of the high-speed train system will show that the state is committed to making the infrastructure investments necessary to sustain economic growth and improve the quality of life of its citizens.

Regional Economic Studies

Six regional economic studies were conducted to evaluate the impact of the high-speed train locally. The studies, conducted by respected economists focused on San Diego, Los Angeles, Orange County, the Inland Empire, the Central Valley and San Francisco Bay Area, and conclude a high-speed train system in California will create hundreds of thousands of jobs, increase safety and reduce congestion throughout the state. Below is a summary of the reports and their findings.

San Diego

A study conducted by the San Diego Institute for Policy Research found that the proposed new train system will ease freeway gridlock in the San Diego region. Eric Bruvold, president of the Institute, said that the high-speed train system will be less costly than expanding highways and airports to serve similar travel demands: "It is more environmentally friendly. It consumes less land and less greenhouse gases as a result of meeting our mobility needs through high-speed train as opposed to cars and planes. The study also shows the high-speed train system will lower demand for auto use in San Diego by nine percent."

The study found that as the high-speed trains divert traffic from highways and airports, capacity increases will lead to reduced travel times for all travelers. And fewer flights to and from California's airports will decrease delays and congestion.

Central Valley

University of California, Merced, economist Shawn Kantor, Ph.D., concluded that the proposed high-speed train system will save Central Valley residents up to $3 billion annually through reduced traffic congestion, trigger significant job creation and be an important factor in increasing taxable income by up to $48 billion per year.

According to Kantor: "Our study shows that based on a shift of transportation dynamics with new options such as high-speed trains combined with the value people place on their time and clean air, the overall direct benefits could amount to approximately $3 billion. The largest component of the savings will be the value of time recouped from avoiding traffic."

San Francisco Bay Area

According to the Bay Area Council Economic Institute report, the proposed California high-speed train system is expected to create 48,000 new permanent jobs in the San Francisco Bay Area. The Council estimated that the total costs of building a high-speed train system will be less than half the amount of expanding highways and airports to provide a similar level of service.

"Our analysis clearly indicates that while transportation projects such as highway and airport expansions are being explored statewide for development between now and 2030, they will not be adequate to accommodate California's growth," said Dr. Sean Randolph, president and CEO of the Bay Area Council Economic Institute. "Additionally, current congestion at the three major Bay Area airports is projected to get worse due to expansion constraints; the high-speed train system will enable airlines to focus on more cost- and capacity-efficient cross-country and international service while relieving regional air traffic congestion."

The report found that a high-speed train system could help Bay Area businesses keep cost-sensitive industries like manufacturing in the state. The system will also increase the number of vacationers traveling to tourism-friendly hubs like San Francisco—particularly from Southern California—boosting the Bay Area hotel and restaurant sectors.

Los Angeles

Dr. Philip J. Romero, Dean of the College of Business and Economics at California State University, Los Angeles, found that high-speed trains will move many passengers from their cars and air service to trains and will infuse billions of dollars into the economy. His study, "Unlocking the Gridlock in Los Angeles County's Transportation System: The Local Economic Benefits of High-Speed Rail," found that the anticipated increase in Los Angeles' aggregate gross domestic product due to high-speed trains will be more than the entire gross domestic product of 20 California counties. These gains will add 2%–4% to the area's economic growth each year throughout the operating lifetime of the high-speed train system.

According to Professor Romero, "High-speed trains will generate more economic benefits *annually* to Los Angeles alone from added economic activity than the entire cost of the Proposition 1A bond, whose expense will be borne only partly by Angelenos, and will be spread over many years."

Professor Romero also found that "The California high-speed train project will put L.A.'s construction industry—the core of our current recession—back to work. What's more, by taking thousands of cars off L.A. highways, it will eliminate a major handicap to our competitiveness and attract green employers with jobs for decades to come."

Orange County

Orange County Business Council's research into the impact of high-speed trains found that Orange County will benefit from more than 23,000 new local jobs by 2020, bringing nearly $103 million in additional tax revenue annually to the county by 2030, and saving residents an estimated $22.6 million annually in direct ticket costs by choosing high-speed train travel over flying.

The Business Council anticipates that high-speed train service will be particularly beneficial to Orange County's tourism destinations such as local beaches, Knott's Berry Farm and the Disneyland Resort. "The average family of four could save nearly $800 by choosing high-speed train travel over round-trip airfare from San Francisco to Anaheim," said Dr. Wallace Walrod, Vice President of Research and Communications for the Business Council. "Savings of this magnitude will surely increase tourism to the area, which already generates $506 million per year in taxes for our local economy."

Inland Empire

Economist Dr. John Husing's study estimated that the proposed high-speed train system will help create nearly 20,000 jobs in the Inland Empire by 2030, and then annually generate more than $700 million in wages/salaries plus contribute more than $2 billion a year to the economy.

Husing's research, "The High-Speed Train System: Inland Empire Impact Study," found that workers in Riverside and San Bernardino counties who use the high-speed train will become more efficient through greater travel reliability, less time spent in traffic, and lower annual travel costs of up to $18,200 per person. The report noted that a by-product for the Inland Empire is that high-speed trains will make Los Angeles-Ontario airports more efficient and help reduce the job-population imbalance in the Murrieta/Temecula areas.

His study found that high-speed train riders can realize significant cost and time savings compared to traveling by automobile. For example, riders between Ontario and Los Angeles can save up to $6,400 per year; riders between Riverside and Los Angeles can save up to $10,900 per year; and riders between Murrieta and San Diego can save up to $11,500 per year.

Building Los Angeles/ Anaheim to San Francisco

The Authority assumes that the full high-speed train system will be in place by 2030. Consistent with current environmental evaluation and project planning, however, this Business Plan is focused on the backbone link between Los Angeles/ Anaheim and San Francisco for which financial calculations have been made.

The California High-Speed Rail Authority has been guided in its planning by regularly updating economic and financial studies since the foundational Business Plan was produced in 2000. The following is an outline of the most recent economic and financial studies that, taken together, constitute the most current update of the Authority's Business Plan.

Figure 15

Operating Costs and Revenues

Passenger Revenues Will Exceed Operating and Maintenance Costs

Overall operation, buttressed by ridership in heavily traveled corridors, is expected to generate passenger revenues in excess of operational and maintenance costs. It is important to note that the State of California will own the system.

Annual operation and maintenance costs by 2030 for the initial phase have been estimated at approximately $1.3 billion. These costs will cover such items as zero-emission electricity, facility operations, station and train staffing, operational management, maintenance of track and equipment, ticketing and revenue accounting, and general management of the rail operations.

With train fares at 50% of airfares, high-speed trains will carry an estimated 55 million trips in 2030 and generate $2.4 billion in ticket revenue in 2008 dollars for the Los Angeles/Anaheim to San Francisco link. The current financial plan assumes that an annual operating surplus of more than $1.1 billion would be used as a return on investment for private sources of major financing and any operating surplus in excess could be used for system improvements and expansion and/or to repay construction bonds.

Cambridge Systematics tested 13 scenarios with train fares, driving costs and airfares at different levels. Higher fares will generate more revenue but dampen ridership, while lower fares will encourage higher ridership but reduce revenues. From this work, two scenarios were developed for this Business Plan, with air and auto costs at 2008 levels and high-speed train fares set at 77% of airline fares and at 50%. A comprehensive fare structure will be a policy determination in future years taking into account such factors as revenue needs, time and distance of travel, advanced purchase, type of service, weekend and holiday demand and other marketing considerations.

Operations & Maintenance Costs*

O&M COST ITEM *Costs shown in millions*	HST Ridership Fare Structure 50% of Airfare (millions)	HST Ridership Fare Structure 77% of Airfare (millions)
Infrastructure Maintenance	$139	$139
Rolling Stock Maintenance	$485	$435
Operations	$556	$491
Insurance	$104	$93
TOTAL	$1,284	$1,160

*O&M costs are based on the 2008 competitive conditions for air and auto (+8% higher than 2006) and HST Fares at 50% and 77% of airfare as described in ridership and revenue document.

Figure 16

Figure 17 A simulation of the interior of an open air/covered high-speed train station

SIMULATION ARTWORK: NC3D

Figure 18 A simulation of the Anaheim ARTIC high-speed train station and facility

SIMULATION ARTWORK: NC3D

Figure 19 A simulation of the high-speed train at Anaheim ARTIC station

The market from the Los Angeles Basin to the San Francisco Bay Area, including San Joaquin Valley intermediate markets, provides over one-half of ridership and 70% of revenue. Short trips entirely inside the Los Angeles/Anaheim area or the San Francisco Bay Area make up 30% of the trips, but only 8% of the revenue because of the shorter length and lower fare structure.

Sacramento area and San Diego County travelers, using the Anaheim, San Francisco and Merced stations to access the train, make up 10% of riders, generating 15% of the revenue. Travel to and from the central coastal counties (from Santa Cruz to Santa Barbara), Northern California and the Western Sierras contribute another 12% of riders and 13% of revenue.

In most markets, higher fares generate more revenue with fewer riders. The exceptions are the longest markets involving San Diego, where airfares and trip times are the most competitive, and within the San Joaquin Valley, where shorter auto trips predominate.

LA/Anaheim to SF Year 2030
Ridership and Revenue Forecast

	Fares 50% of air (millions, 2008 $)		Fares 77% of air (millions, 2008 $)	
Market Pairs (Ultimate trip ends)	**Riders**	**$$**	**Riders**	**$$**
LA Basin - SF Bay Area, with intermediate markets	31.6	$ 1,679	22.6	$1,842
LA Basin - SF Bay Area	10.8	$ 735	7.3	$ 762
San Joaquin Valley - LA Basin	8.3	$ 355	6.1	$ 418
SF Bay Area - San Joaquin Valley	7.3	$ 346	5.5	$ 399
Monterey Bay/Central Coast - LA Basin	1.9	$ 114	1.5	$ 130
Monterey Bay/Central Coast - SF Bay Area	2.4	$ 100	1.7	$ 106
Within San Joaquin Valley	0.9	$ 29	0.5	$ 27
San Diego region - SF Bay Area	3.3	$ 234	2.0	$ 219
LA Basin - Sacramento region	1.9	$ 132	1.3	$ 135
Other Interregional	1.4	$ 64	1.0	$ 69
North & Sierras regions - LA Basin	0.7	$ 36	0.5	4 40
Sacramento region - San Joaquin Valley	0.6	$ 32	0.5	4 39
San Diego region - San Joaquin Valley	0.1	$ 3	0.1	4 4
LA Basin - San Diego region	0.1	$ 2	0.1	$ 2
San Diego region - Sacramento region	<0.1	$ 2	<0.1	$ 1
Interregional subtotal	**39.8**	**$ 2,184**	**27.9**	**$2,351**
within North LA Basin	4.7	$ 58	3.7	$ 69
within SF Bay Area Peninsula	4.8	$ 54	3.7	$65
North LA - South LA	3.8	$ 43	3.2	$ 55
within South LA Basin	1.5	$ 16	1.4	$ 22
Local within-region subtotal	**14.8**	**$ 171**	**12.0**	**$ 211**
Total	**54.6**	**$ 2,355**	**39.9**	**$ 2,562**

Figure 20

Capital Cost

The high-speed train system's backbone Los Angeles/Anaheim to San Francisco link is expected to cost about $33 billion, in 2008 dollars. Construction costs include stations, track work, earthwork, structures, grade separation, right-of-way acquisition, environmental impact mitigation, rail and utility location, signals and communications infrastructure, and electric power supply and distribution. Specific items of note in the cost estimate include fencing along the entire right-of-way, barriers where necessary for separation from incompatible rail traffic and grade separation from all automobile traffic. The cost estimate also includes a contingency, calculated at 30 % of the construction cost, as well as an allowance for environmental impact mitigation, calculated at 3% of the construction cost.

Capital Costs by Segment

CONSTRUCTION SEGMENT	Capital Cost (shown in millions)	Length (miles)	Average Cost per Mile
San Francisco to San Jose	$ 4,210	50	$ 84.2
San Jose to Central Valley Wye	$ 5,175	120	$ 43.1
Merced to Fresno	$ 2,093	60	$ 34.9
Fresno to Bakersfield	$ 4,249	115	$ 37.0
Bakersfield to Palmdale	$ 3,892	85	$ 45.8
Palmdale to Los Angeles	$ 5,438	60	$ 90.6
Los Angeles to Anaheim	$ 1,994	30	$ 66.5
Program Implementation	$ 2,584		
Trainsets *(50% - 77% Airfare HST Fare)*	$ 2,835 - 3,990		
TOTAL	$ 32,785 - 33,625		

Figure 21

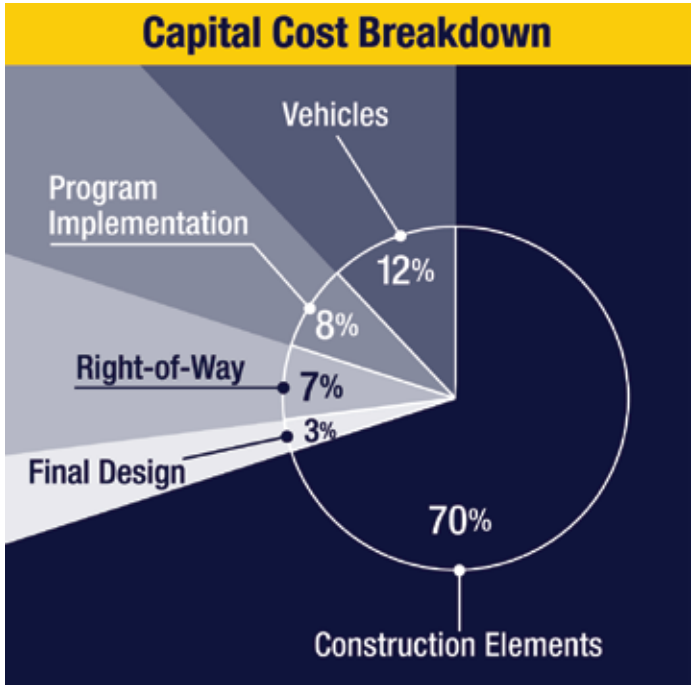

Figure 22

Over the next three years the Authority will be completing the required preliminary engineering and environmental review on the Los Angeles/ Anaheim to San Francisco backbone segment before construction begins. During this period, the total amount of state bond funding needed to complete this work will be small—estimated at less than 2% of the cost. Once right-of-way acquisition begins and construction is initiated, the need to tap into authorized state bond funds as well as federal, local and private sector funds will increase. Figure 25 illustrates the level and timing of funding needed over the implementation period for the Los Angeles/Anaheim to San Francisco link.

The capital cost estimates presented here are based on realistic estimates of many of the unit costs in building such systems at 2008 prices. Many cost elements such as electrification, signaling, rail, and track bed are quantities well known from rail projects around the world. The costs for major civil works, including tunneling and structures are specific to California's geology, seismic conditions and labor markets, but also well known from freeway construction, major water projects and urban rail projects around the state.

Figure 23 A simulation of the Sacramento station and possible surrounding development

SIMULATION ARTWORK: NC3D

Capital Costs by Cost Item

Construction Item (Costs shown in millions)		
Environmental Mitigation	$ 669	2.8%
Rail and Utility Relocations	$ 579	2.5%
Earthwork	$ 3,614	15.3%
Structures	$ 6,004	25.5%
Grade Separations	$ 4,222	17.9%
Track	$ 1,412	6.0%
System Elements	$ 2,004	8.5%
Electrification	$ 1,539	6.5%
Buildings	$ 3,504	14.9%
TOTAL CONSTRUCTION	**$ 23,547**	
Other Costs		
Program Implementation	$ 2,584	
Final Design (4.5% of Construction)	$ 1,060	
Right-of-Way	$ 2,444	
Vehicles	$ 3,150 - 3,990	
TOTAL CAPITAL COSTS	**$ 32,785 - 33,625**	

Figure 24

Finance Plan

A State, Federal, Local and Private Partnership

State Funding

The State of California has historically played a major role in the development of passenger rail service. Consistent with this role, Proposition 1A on the November 2008 ballot will provide $9 billion in state general obligation bonds that require other federal, local, state and private financing to be secured before construction can proceed. Another $950 million included in the bond measure will be used to finance capital improvements to commuter, intercity rail and transit lines in order to connect existing infrastructure to the high-speed train system. Passage of AB 3034 (Galgiani) demonstrated the state's financial and political support for the high-speed train project, which is essential in generating necessary support from federal, local and private sources.

Federal Funding

Federal funding is one of the three main funding sources identified for the development of this project. The Authority is currently targeting $12-$16 billion from federal sources. This funding is expected to come through federal transportation programs and through the creation of new programs designed to promote high-speed intercity passenger rail facilities. The Authority expects federal support for high-speed trains to strengthen as on October 16, 2008, the first high-speed intercity rail grant program was established with the signing of the Rail Safety Improvement Act of 2008 (HR 2095) by President Bush. Although the California high-speed train system's scale is larger than a typical major transportation project, there is precedent for significant federal support. The federal government currently supports 50%–80% of major highway, transit and aviation projects. A number of existing federal programs support rail travel, and Congress is currently considering new programs that could provide additional support for high-speed train systems.

Local Funding

The Authority's financing plan for the Los Angeles/Anaheim to San Francisco link is targeting between $2-$3 billion in local financial support based on potential overlapping infrastructure needs, and a broad overview of local revenue authority and local borrowing capacity in the counties along the project's proposed routes.

Local financial support can include:

- Cost-sharing with local agencies
- Locally generated revenues from transit-oriented development
- Commercial concessions at high-speed train stations
- Cooperative funding arrangements with local transportation agencies
- Contribution of right-of-way

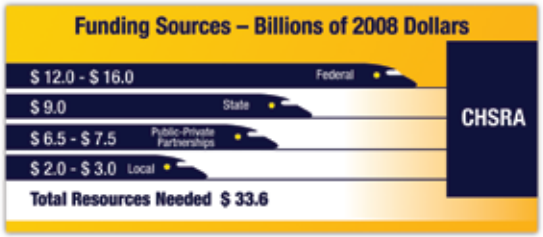

Figure 26

Figure 25

Private Funding/Public-Private Partnerships (P3)

Interest from the private sector is strong and diverse. The Authority, assuming normalized market conditions, is targeting $6.5-$7.5 billion in potential P3 funding for the Los Angeles/Anaheim to San Francisco section of the project. Major sources of investment are likely to include private equity funds, pension funds, new infrastructure funds and corporate operational partners.

In the spring of 2008, the Authority issued a Request for Expressions of Interest (RFEI) as an effort to gauge private sector interest in participating in a P3 arrangement for the high-speed train project. Interest was strong, especially among construction firms, system and equipment providers, financial institutions and operators. However, most private firms responding made it clear that they would need both financial and political commitments from state officials that government would share the risks to their participation. The amount of private funding and timing of private sector participation will be a reflection of how risky the private sector perceives this project overall.

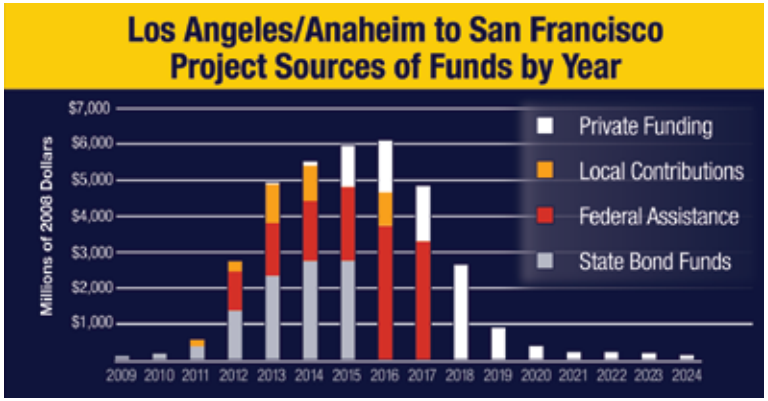

Figure 27

Financing Other Parts of the High-Speed Train System

Proposition 1A provides $9 billion in bond proceeds that can be used for planning and engineering the system's entire 800-mile route. It makes the Altamont rail corridor connecting the Central Valley to the East Bay and the other high-speed train corridors (Los Angeles to San Diego, and the link to Sacramento) eligible for the state's high-speed train bond money as well as federal and other revenues made available to the Authority. The other high-speed train corridors can compete for and use the bond for capital costs with available funding as long as there is no adverse impact on the Los Angeles/Anaheim to San Francisco priority segment.

These other segments can, in fact, be implemented concurrently with the Los Angeles/Anaheim to San Francisco link. Proposition 1A requires the Authority to give priority in selecting corridors for construction to those that are expected to require the least amount of bond funds as a percentage of total cost of construction.

This Business Plan demonstrates how the system's backbone link (Los Angeles/Anaheim to San Francisco) can be financed. The remaining segments of the proposed high-speed train system could be implemented incrementally. Each additional segment added to the system (for example Merced to Modesto, or Los Angeles to East San Gabriel Valley) will increase the potential revenue surplus of the system at a marginal incremental increase in cost. Based on this approach, the link to Sacramento (via Merced) and the Los Angeles to San Diego (via the Inland Empire) link could be funded through additional local, state, federal or private-sector financing (including revenue bonds), generating further revenue surpluses.

Risks and Mitigation

A project as large and complex as California's high-speed train system will entail a number of risks to both the Authority and other participants. The key risks identified to date include:

- *Construction Risk*
- *Technology and Operations Risk*
- *Legislative Risk*
- *Ridership Risk*
- *Completion Risk*

Construction Risk

The Authority can help limit the state's exposure to future construction cost increases by transferring this risk to a private partner through innovative contracting methods, like design-build, which have been very effective delivering projects on time and within budget.

The Authority will also use more traditional performance bonding to create incentives for its contractors to fulfill their contract obligations.

Risk associated with the increasing price of materials can be managed by working closely with the engineering team to maintain efficient design and value engineering where appropriate, and by factoring contingencies into its cost estimates to ensure that sufficient resources are available in the event that projected costs do increase. Such contingencies have been included in all cost estimates to date, and will continue to be incorporated until the Authority has price certainty as each segment progresses through its development.

Technology and Operations Risk

Due to the size of the project, it is possible that private participation will be split among several companies or consortia, raising the potential for integration issues involving operating and communications equipment.

The Authority can work to mitigate this risk by providing contract incentives that encourage project participants to achieve seamless integration. Likewise, the Authority and the Program Management Team will set standard criteria for all consultants and contractors to follow in designing and constructing the system to further mitigate the risk of technical incompatibility. The Authority will also choose from existing and proven high-speed train technology and provide for a testing period before launching the system.

In order to assure the highest standards, the Authority will select a system operator with extensive experience in high-speed train or related transportation modes. The Authority will also require its operators to provide security for the project in the event that it needs to seek damages for nonperformance. Lastly, any concession or operating agreement will contain rigorous standards that, if not met, will result in penalties or the right to transfer operations to another, more qualified operator.

Legislative Risk

In order to mitigate the risk that future action taken by federal or state lawmakers could restrict or delay necessary funding for the project, Authority staff has and will continue to communicate fully with the California High-Speed Rail Authority Board and the State Legislature regarding the project's objectives and the support needed from lawmakers.

A key step will be to protect and clarify the powers granted to the Authority in its enabling legislation to enter into public-private partnerships. The clearer the ability of the Authority to procure, select and negotiate with private partners, the lower the perceived risk by the private sector. Lower perceived risk will increase the quantity and quality of procurement bids, resulting in a better value to the state.

A transparent, streamlined process for disbursement of state bond proceeds also will be an important step. Private participants must have confidence that any allocation and disbursement process will not delay or reduce payment for services, or they will increase their bids to compensate for this additional risk.

The best way for the Authority to limit its risk of not obtaining adequate federal funding is to develop a federal strategy that targets both existing federal programs as well as opportunities for new legislation that are best for both California and the federal government.

Ridership Risk

As currently envisioned, private funding is expected—backed largely by the projected operating surplus of the system. If ridership or revenues were to be lower than forecast, the project could suffer from constrained private funding.

The Authority could limit future ridership risk through partial transfer of this risk to the private sector via an innovative public-private partnership. The Authority's Request for Expressions of Interest (RFEI) in the spring of 2008 confirmed that there is substantial private sector interest in California's high-speed train. RFEI participants confirmed that they would be willing to accept a portion of their payment for services subject to ridership risk.

Figure 28 A simulation of passengers and the high-speed train inside the Transbay Terminal SIMULATION ARTWORK: NC3D

The Authority can also mitigate future ridership risk by:

- Promoting state policies that encourage high-speed train ridership
- Locating well-placed stations in large urban centers, with adequate connections to the existing and planned transit, air, and road networks
- Marketing the high-speed train to future riders

The state also should adopt a future transportation plan that encourages high-speed train as a viable alternative to intrastate air and highway travel.

Completion Risk

Due to the project's size and the duration of the expected construction period, full funding is not expected to be available when the project commences. Completion risk could arise if full funding does not materialize even after state, federal and local monies have been spent to begin construction, resulting in an incomplete system. Private funds may not materialize for several reasons, including lower than expected ridership, delays in the development of the project or a downturn in the financial markets.

To mitigate this risk, the Authority has developed a phasing plan that promotes maximum utility throughout the construction period. Smaller segments in and around the Los Angeles basin and the San Francisco Bay Area will provide immediate benefit to improved local commuter rail service and not require an operating subsidy beyond what is currently provided to local entities, even if full system funding were to fail to materialize. Thereafter, segments linking the Central Valley with a major metropolitan area will provide an immediate benefit to communities underserved by current air or rail services. In many cases, such segments are projected to be "self supporting" over time and not require an ongoing operating subsidy.

Figure 29 A simulation of the high-speed train entering and exiting a tunnel

SIMULATION ARTWORK: NC3D

Business Plan 2008 Source Documents

The California High-Speed Rail Authority (CHSRA) released its first comprehensive Business Plan in 2000 and has been guided in its planning since then by regularly updated economic and financial studies. This Business Plan was based on the following studies and analyses which, taken together, constitute the most current update of the Authority's Business Plan. These materials are available on the Authority's Web site **(www.cahighspeedrail.ca.gov)** or by contacting the Authority at **916.324.1541**.

- *High-Speed Train Systems – CHSRA*
- *Total Transportation Approach – CHSRA*
- *Selection Criteria – CHSRA*
- *Financial Plan – Infrastructure Management Group, Inc. (IMG), Goldman Sachs, Barclays Capital, Sperry Capital International*
- *Ridership and Revenue – Parsons Brinckerhoff/Cambridge Systematics, SYSTRA*
- *Engineering Elements – Parsons Brinckerhoff*
- *Benefit-Cost Analysis – Cambridge Systematics*
- *Cost-Benefit Technical Report – Cambridge Systematics*
- *Request for Expressions of Interest – Parsons Brinckerhoff/IMG*
- *AB 3034 (Galgiani) Final Chaptered Language*
- *CHSRA 2000 Business Plan – www.cahighspeedrail.ca.gov*
- *CHSRA Blueprint for Building California's High-Speed Train – www.cahighspeedrail.ca.gov*
- *CHSRA Program-Level EIR/EIS – www.cahighspeedrail.ca.gov*

- *Regional Economic Studies –*

California High-Speed Rail Economic Benefits and Impacts in the San Francisco Bay Area
A Bay Area Council Economic Institute Report
October 2008

The Economic Impact of the California High-Speed Rail in the Sacramento/Central Valley Area
Shawn Kantor, Ph.D., County Bank Professor of Economics
University of California, Merced
September 2008

Unlocking the Gridlock in Los Angeles County's Transportation System: The Local Economic Benefits of High-Speed Rail
Philip J. Romero, Ph.D., Dean and Professor of Economics
College of Business and Economics, California State University Los Angeles
October 8, 2008

The Economic Impact of High Speed Trains for Orange County
Orange County Business Council
October 2008

California High Speed Train System's Impact on the Inland Empire, 2030
John E. Husing, Ph.D.
Economics & Politics, Inc.
October 2008

San Diego Regional Economic Impact Study of the California High Speed Train Project
San Diego Institute for Policy Research
September 2008

CALIFORNIA HIGH-SPEED RAIL AUTHORITY
925 L Street, Suite 1425
Sacramento, CA 95814
916-324-1541
916-322-0827 fax

For additional information, visit the
California High-Speed Rail Authority's Web site at
www.cahighspeedrail.ca.gov